1 **Abstract**

2   A method and apparatus for increasing the capacity of a system

3 that use four transmit antennas and that employs conventional channel

4 coding by performing space-time coding in a particular way. Each of two

5 pairs of symbol sub-streams is space-time coded to form a respective

6 pair of transmit-sequence chains, where at least one of the formed pairs

7 of the transmit-sequence chains is a function of symbols of the respective

8 symbol-sub-stream pair and not a function of the symbols of the other

9 symbol-sub-stream pair. Four transmit sequences—two transmit

10 sequences from each of the two pairs of symbol sub-streams—may be

11 viewed as forming a transmission matrices **B** or **B´** arranged as follows:

$$
\begin{array}{cccc}
 & T_1 & T_2 & T_3 & T_4
\end{array}
$$

$$
\begin{array}{l}
Antenna\ 105-1 \\
Antenna\ 105-2 \\
Antenna\ 105-3 \\
Antenna\ 105-4
\end{array}
\begin{bmatrix}
b_1 & b_1 & -b_2^* & -b_2^* \\
b_2 & b_2 & b_1^* & b_1^* \\
b_3 & -b_3 & -b_4^* & b_4^* \\
b_4 & -b_4 & b_3^* & -b_3^*
\end{bmatrix}
\ or,\
\begin{array}{l}
Antenna\ 105-1 \\
Antenna\ 105-2 \\
Antenna\ 105-3 \\
Antenna\ 105-4
\end{array}
\begin{bmatrix}
b_1 & -b_2^* & 0 & 0 \\
b_2 & b_1^* & 0 & 0 \\
0 & 0 & b_3 & -b_4^* \\
0 & 0 & b_4 & b_3^*
\end{bmatrix}
$$

14 respectively, where b_1, b_2, b_3, and b_4 are the symbols derived from a

15 respective one of four symbol sub-streams, and b_1^*, b_2^*, b_3^*, and b_4^* are,

16 respectively, the complex conjugate of the aforementioned symbols. The

17 rows of the matrix represent the different antennas, while the columns

18 represent different symbol periods.